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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,232	12/01/2003	Brian H. Moeckly	844,004-303	3720
34263 7590 10/09/2007 O'MELVENY & MYERS LLP 610 NEWPORT CENTER DRIVE 17TH FLOOR NEWPORT BEACH, CA 92660			EXAMINER VIJAYAKUMAR, KALLAMBELLA M	
			ART UNIT 1795	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/726,232

Applicant(s)

MOECKLY ET AL.

Examiner

Kallambella Vijayakumar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13 and 24 is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-23, 25-27 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

- A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/17/2007 has been entered.
- Claims 1-27 and 32 are currently pending with the application. Claims 1, 14 and 26-27 were amended. New claim 32 was added. Claims 28-31 cancelled.
- The examiner has considered the IDS filed 07/17/2007.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not disclose "the reaction zone being free of oxygen" in the claims 1 and 14.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-12, 26-27 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (US 6,835,696).

Saito et al teach a method of forming as-grown superconducting MgB₂ films over a substrate in a carousel apparatus equipped with a Mg-target, B-target, Al-Target, heated sample/substrate, associated vacuum and monitoring systems, and a platform for supporting the carousel (Abstract; Fig-1, CI-2, Ln 58-CI-3, Ln 10). The process was carried out by ejecting Mg and B from their targets by simultaneously by sputtering forming the MgB₂ film without annealing in the reaction room (CI-2, Ln 1-10). The substrates included MgO and Al₂O₃ that were heated to a temperature of 250-400C and the substrates were rotated at speed of 50 rpm. The reaction was carried out at a pressure of 2-5 millitorr and for a period of 10-60 mins (C-3, Ln 61 – C-4, Ln 21). Moving of the substrate back into reaction/deposition zone would be obvious over rotating carousel. The prior art further teaches forming the films in a static type apparatus

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(C-5, Ln 60-61). The presence of depressurized zones and pressurized deposit zones due to the presence of metal vapors within the reaction unit would be obvious. The unit meets the limitation of reaction zone free of oxygen. Further removal of oxygen from the system would be obvious over the pyrophoric nature of magnesium. The presence of separated zones within the coating system is not a required limitation of the claims. Although, a distinctly separate deposition zone is not taught by the prior art, it shows a continuous reaction in a reaction room and evaporation zones for Mg and B, and a mere fact that a given structure is integral does not preclude its consisting of various elements, and meets the limitation of apparatus claimed to carry out the deposition process. In re. Howard, 168 USPQ 177,179 (PTO Bd of Int. 1969).

The prior art fails to teach depositing boron on a substrate and then exposing the boron to magnesium vapor per the claims –1 and 26.

However, prior art teaches sputter depositing boron and magnesium on a substrate forming MgB_2 , and the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results; In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930) <MPEP 2144.04>. This further meets the limitations of claims 26-28.

With regard to claim-2, the prior art teaches the rotation of the flat surface of the substrate along an axis in the carrousel.

With regard to claims 3, 6 and 11, the prior art teaches rotating the substrate and varying the reaction pressure in millitorr range which are known variables. Generally, differences in concentration, pressure rotation or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration, pressure rotation or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

With regard claims 4-5, the prior teaches a substrate of Al_2O_3 and MgO heated to 250-450C.

With regard to claim-7, the prior art teaches a RF sputter ejection of Mg from a Mg target forming its plume but silent about using other modes of vaporizing the target. The resistive heating of a target

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generating vapor/plume in forming a sputter thin film is well known in the art (See Face et al US 5,389,606, CI-7, Ln 34-40; Zeng et al USA 6,797,3471, C-2, Ln 31-41, 51-55) and it would be obvious to a person of ordinary skilled in the art to substitute the RF with a resistance heating method of vaporization in the process as functional equivalent with reasonable expectation of success .

The substrate containing a layer of MgO meets the limitation of a wafer in claim-8.

With regard to claim-9, the prior is silent about nature of the substrate being a tape i.e. a rectangular substrate, and use of rectangular substrate in coating the film would be obvious to a person of ordinary skilled in the art over the teachings of Zheng forming a tape by depositing a thin film of MgB₂ superconductor on a substrate in a static apparatus (US 6,797,341; CI-1, Ln 17-18).

With regard to claims-10 and 12, the prior art teaches multiple substrate holders and processing of plurality of substrates coating the boride superconductor over at least one face would be obvious.

With regard to claims 27 and 32, the prior art teaches MgB₂ film.

2. Claims 14-23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (US 6,835,696) in view of Shimakage et al (US 6,929,820).

Saito et al teach a method of forming as-grown superconducting MgB₂ films over a substrate in a carrousel apparatus equipped with a Mg-target, B-target, Al-Target, heated sample/substrate, associated vacuum and monitoring systems, and a platform for supporting the carrousel (Abstract; Fig-1, CI-2, Ln 58-CI-3, Ln 10). The process was carried out by ejecting Mg <evaporation cell> and B from their targets by simultaneous sputtering forming the MgB₂ film without annealing in the reaction room (CI-2, Ln 1-10). The substrates included MgO and Al₂O₃ that were heated to a temperature of 250-400C and the substrates were rotated at speed of 50 rpm. The reaction was carried out at a pressure of 2-5 millitorr and for a period of 10-60 mins (C-3, Ln 61 – C-4, Ln 21). Moving of the substrate back into reaction/deposition zone would be obvious over rotating carrousel. The prior art further teaches forming the films in a static type apparatus (C-5, Ln 60-61). The presence of depressurized zones and pressurized deposit zones due to the presence of metal vapors within the reaction unit would be obvious. The unit meets the limitation of reaction zone free of oxygen. Further removal of oxygen from the system would be obvious over the

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pyrophoric nature of magnesium. Although, a distinctly separate deposition zone is not taught by the prior art, it shows a continuous reaction in a reaction room and evaporation zones for Mg and B, and a mere fact that a given structure is integral does not preclude its consisting of various elements, and meets the limitation of apparatus claimed to carry out the deposition process. In re. Howard, 168 USPQ 177,179 (PTO Bd of Int. 1969).

The prior art fails to teach using an electron beam gun for evaporating boron on to a substrate or a distinctly separate deposition zone per the claim-14.

In the analogous art, Shimakage teaches forming MgB₂ films by evaporating Boron with electron beam (Abstract/Fig-1).

It would be obvious to a person of ordinary skilled in the art to substitute the RF sputtering for B in the process of Saito et al with electron beam vaporization of Shimakage et al as functional equivalent with reasonable expectation of success.

With regard claims 15 and 18 , the prior teaches a substrate of Al₂O₃ and MgO heated to 250-450C.

With regard to claim-16, the prior art teaches a RF sputter ejection of Mg from a Mg target forming its plume but silent about using other modes of vaporizing the target. The resistive heating of a target generating vapor/plume in forming a sputter thin film is well known in the art (See Bunshah et al US 5,494,558, Cl-2, Ln 35-37; Zeng et al USA 6,797,3471, C-2, Ln 31-41, 51-55) and it would be obvious to a person of ordinary skilled in the art to substitute the RF with a resistance heating method of vaporization in the process as functional equivalent and further optimize the temperature for vaporizing Mg with reasonable expectation of success.

With regard to claims 17, 22 and 25, the prior art teaches rotating the substrate and varying the reaction pressure in millitorr range which are known variables. Generally, differences in concentration, pressure rotation or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration, pressure rotation or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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The substrate containing a layer of MgO meets the limitation of a wafer in claim-19.

With regard to claim-20, the prior is silent about nature of the substrate being a tape i.e. a rectangular substrate, and use of rectangular substrate in coating the film would be obvious to a person of ordinary skill in the art over the teachings of Zheng forming a tape by depositing a thin film of MgB₂ superconductor on a substrate in a static apparatus (US 6,797,341; CI-1, Ln 17-18).

With regard to claims-21 and 23, the prior art teaches multiple substrate holders and processing of plurality of substrates coating the boride superconductor over at least one face would be obvious.

3. Claims 1-12, 14-23, 25-27 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matijasevic et al (US 6,527,866) in view of Kim et al (6,626,995).

The prior art teaches an apparatus and method of making thin films of superconducting materials over a substrate by depositing the metallic components in a plurality of depositing zones and reacting them in same number of reaction zones by alternating/rotating the substrate between these zones and finally with a gaseous element such as oxygen in a reaction zone forming the thin film of the compound (Abstract; Fig 1-10; CI-1, Ln 27-45; CI-5, Ln 8-CI-10, Ln 44). The substrates included sapphire, silicon, alumina and magnesia (CI-3, Ln 66-CI-4, Ln 8). The thin film included CMR materials, superconducting YBCO and BSCCO, and a compound with the formula A_{1-x}B_x (CI-3, Ln 26-42; CI-6, Ln 60-65). The pressure in the deposition chamber was about 0.0001-.01Pa and that of the reaction chamber was 0.5-20Pa that meets the limitation of substantially sealed in the claims (CI-5, Ln 15-17; CI-8, Ln 64-67). The prior art further teaches heating either the sample or entire zone in the range of 600-800C (CI-5, Ln 37-40). The disclosure in the prior art meets the limitation various process steps claimed by the instant claim 26. The prior art further teaches the apparatus and the process can be used with any material that can be evaporated and optimizing the relative sizes of the reaction and deposition zones based on the stoichiometry of a binary compound such as A_{1-x}B_x (CI-6, Ln 32-33; 52-67). The prior art device used for operating the process steps is similar to that in the instant claimed process and When the prior art device is the same as a device described in the specification for carrying

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out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986).

The prior art fails to teach a method of making a MgB₂ superconductor film per the limitations of the instant claims by the applicants.

In the analogous art, Kim teaches a method of making the MgB₂ superconductor film by depositing a non-stoichiometric compound on a substrate and then exposing it to Mg vapor between 400-900C (Abstract, Fig 5A, 5B, 6A, and 6B) using an e-beam (CI-4, Ln 25-26; 55-61), or by depositing boron film over a substrate and then exposing it to Mg vapors at 400-900C (CI-5, Ln 32-43) in a vacuum apparatus (CI-5, Ln 14-19). The prior art teaches the substrates for the films to be SiC, MgO and SrTiO₃ (CI-3, Ln 46-59, CI-4, Ln 1-8).

It would have been obvious to a person of ordinary skilled in the art to substitute the targets in the apparatus and process of making superconductor film by Matijasevic et al with Mg and B targets of Kim et al as functional equivalents with reasonable expectation of success, because Matijasevic et al teaches that any material that can be evaporated can be used, and the combined prior art teaching is suggestive of the claimed process steps. With regard to electron beam gun in claim-14, the prior art teaches an e-gun evaporation of target materials (CI-6, Ln 25-27). When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986).

With regard to claim-2, the prior art teaches the rotation of the substrate.

With regard to claims 3-4, 6, 11, 15-17, 22 and 25, the prior art teaches rotating the substrate, heating the substrate between 600-800C, a depositing chamber pressure of 0.0001-0.01 Pa and a reactant pressure of 0.2-20 Pa which are known variables that can be optimized by routine experimentation by a person of skilled in the art. Generally, differences in concentration, pressure, rotation or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration, pressure rotation or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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With regard claims 5, 8 and 18-19, It would have been obvious to a person of ordinary skilled in the art to utilize such as SiC, MgO and SrTiO₃ (CI-3, Ln 46-59, CI-4, Ln 1-8) of Kim et al in the apparatus and process of Matijasevic et al as functional equivalents of substrates with reasonable expectation of success because the combined prior art teaching is suggestive of the claimed substrates. The substrate containing a layer of MgO meets the limitation of a wafer in the claims.

With regard to claim-7, the combined prior art teaching is suggestive of a Mg target .

With regard to claims 9 and 20, the prior is silent about nature of the substrate being a tape i.e. a rectangular substrate, and use of rectangular substrate in coating the film would be obvious to a person of ordinary skilled in the art over the teachings of Zheng forming a tape by depositing a thin film of MgB₂ superconductor on a substrate in a static apparatus (US 6,797,341; CI-1, Ln 17-18).

With regard to claims 10, 12, 21 and 23, the prior art teaches multiple substrate holders with multiple chambers thus processing of plurality of substrates, and further coating the superconductor over at least one face of a substrate would be obvious.

Forming a MgB₂ film per claim 27 would be obvious over the combined prior art teachings.

Allowable Subject Matter

Claims 13 and 24 allowed.

The prior art or record neither teaches nor fairly suggest applicants process of making MgB₂ films by the applicant's method steps.

Response to Amendment

The declaration under 37 CFR 1.132 filed 07/17/2007 is insufficient to overcome the rejection of claims based upon Matijasevic as set forth in the last Office action because: the declaration states that the Majosovic apparatus is used in general to charge with nitrogen or ammonia or oxygen and not intended to charge metallic species (Page-2, item-7) is not persuasive because the prior art teaches charging gaseous reaction material that includes any vapors because the cited gases are exemplary and not limiting to it because Mg vapor is a gaseous reactant, and when the prior art device is the same as a

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device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986).

Response to Arguments

Applicants response filed 07/17/2007 have been fully considered. With regard to the argument that limitation of "the reaction zone free of oxygen" in claims 1 and 14, the cited paragraph recites "The above-described method also effectively avoids MgO contamination because there are negligible amounts of oxygen and MgO in the reaction chamber 26 where MgB.sub.2 is formed." (Res, Pg-9, Para-2), And does not find literal support for the limitation, and Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See In re Johnson, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977) ("[the] specification, having described the whole, necessarily described the part remaining."). See also Ex parte Grasselli, 231 USPQ 393 (Bd. App. 1983), aff 'd mem., 738 F.2d 453 (Fed. Cir. 1984). Applicant's argument that it is not obvious to introduce metallic vapors in Matijasevic apparatus that teaches gaseous elements (Res, Pg-10, Para-3 – Pg-11, para-1) has been addressed in the preceding rejection and the response to amendments. With regard to the benefits of applicants claimed process over the Matijasevic et al (Res, Pg-12, para-2; Pg-13, para-3), the examiner makes record of this, but they are not the limitations of the claims that requires oxygen free environment.

For the reasons set forth above, applicant's fail to patentably distinguish their method over the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KMV/
Sept 29, 2007

/Mark Kopec/
Mark Kopec
Primary Examiner TC 1700